PROJECT NUMBER : 4016
PROJECT TITLE : Paper Technology
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I. MAGNESIUM CARBONATE PAPERS (G. Bokelman, S. Tafur)

A. **Objective:** To produce commercial quantities of a magnesium carbonate paper.

B. **Results:** The evaluation of additional handsheets made by both PM and Ecusta incorporating magnesite and calcium carbonate, with and without 5% magnesium hydroxide, was completed. Sidestream reductions ranged from 38 to 75%. The upper limit for porosity to maintain good sidestream reduction was shown to be .9-10 Coresta. The inclusion of at least 10-12% calcium carbonate is needed to provide acceptable ash appearance. The addition of 5% magnesium hydroxide in the filler system decreases sheet porosity and improves sidestream reduction. Subjective screening of handmade cigarettes suggested that papers at basis weights of 45 g/m^2 rather than 55 g/m^2 and those without the addition of magnesium hydroxide were preferred. The sizing combination of potassium citrate, sucrose, and citric acid as developed by Ecusta, however, does seem to improve the magnesium hydroxide-containing papers. It is of interest to note that the exact type of calcium carbonate and magnesium hydroxide did not appear to be critical for paper performance or subjectives. Based on both visibility data and subjective screening results, specifications were established for three papers which were successfully produced in a mill run at Ecusta.

C. **Plans:** Determine the effects of different paper sizings on sidestream reduction, ash appearance, and subjective performance for the three magnesium carbonate papers.

II. PUFF COUNT CONTROL/ASH FLAKING (B. Geiszler, S. Baldwin)

A. **Objective:** To evaluate cigarette papers with varying parameters to understand and optimize their effects on puff count, static burn times, and ash flaking.

B. **Results:** Based on the evaluation of 22 different models prepared for Project BOLD with different papers, three papers were selected for further evaluation in order to make the final selection of the paper for use for a March POL. Three mill runs have been completed by Kimberly-Clark to produce those papers: a 25 g/m^2 sheet with 30% Albacar chalk at 46 Coresta porosity and 1.7% citrate; a 25 g/m^2 basis weight sheet with 36% Albacar chalk, 46 Coresta porosity and 1.7% citrate; and a paper with 28.5 g/m^2 basis weight and 30% Albacar chalk, at the same Coresta and citrate levels. The higher basis weight paper is designed to provide the same flax content as a 25 g/m^2 paper with 25% chalk.

Papers made with higher chalk content produced cigarettes with reduced puff count at lower citrate levels. Papers with higher basis weight also gave the same result. The

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fine particle size chalk also accelerated burn rate. An invention disclosure was filed documenting the finding on particle size, which confirmed earlier work. A product patent may be possible to obtain coverage for the increased basis weight and chalk content papers.

Handsheets were produced to determine the relative impact of various grades of calcium carbonate on handsheet physical properties. The inclusion of Multifex carbonate in handsheets at equal porosity reduces tensile strength relative to Albacar or Omega Fine (0.02 micron particle size). The brightness of Multifex is equivalent to Albacar, and both are higher than Omega Fine. The results for Multifex and Albacar reflect the properties of papers prepared by KC for Project BOLD.

Smoking results for nine Marlboro UL prototypes made with papers containing different ratios of sodium citrate to potassium citrate showed no difference in puff count for sodium/potassium ratios of 0.8, 1.5 and 2.8. This observation held true for all three citrate levels tested (1.0, 1.7 and 2.5%). Eleven Marlboro UL models were made with papers containing different types and levels of calcium carbonate; ash flaking evaluations will be conducted for the models.

C. Plans: Evaluate Project BOLD models for ash flaking and puff count. Evaluate Ecusta papers containing various levels of calcium carbonate for analytical smoking performance on cigarettes.

III. WOOD PULP CIGARETTE PAPERS (B. Geiszler)

A. Objective: To qualify alternative suppliers of wood pulp cigarette papers.

B. Results: Bristol 100 FF and Cambridge KS FF cigarette models were made with Wattens wood pulp papers for qualification testing versus Kimberly-Clark wood pulp grades. Wattens has indicated that they use a mixture of aragonite and calcite (two different crystalline forms of calcium carbonate) in their wood pulp papers. Analytical smoking results for Cambridge and Bristol models made with Wattens wood pulp papers containing aragonite were indistinguishable from the control models made with Kimberly-Clark wood pulp grades, which contain only the calcite form of calcium carbonate. The cigarettes will be evaluated subjectively by the Richmond Panel. Cigarettes were also made with Ecusta wood pulp papers for qualification testing. Analytical smoking is in progress.

C. Plans: Determine analytical and subjective performance of Bristol and Cambridge models made with papers from the three suppliers.

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IV. SELECTIVE FILTRATION (B. Geiszler, A. Finley)

A. **Objective:** Identify smoke components whose delivery correlates with the subjective performance of low sidestream cigarette models.

B. **Results:** Detailed analyses of mainstream smoke were completed by Analytical Research for fifteen cigarette models with different filter constructions. Statistical analyses of the data are in progress to identify any smoke composition trends. PED subjective assessments of the models show a clear differentiation between models made with a low sidestream paper and those made with a conventional paper. Use of a charcoal filter with the low sidestream paper improves the acceptability rating of the cigarette relative to a conventional CA filter. Treatment of the charcoal with an acid or base does not increase the acceptability.

C. **Plans:** Correlate analytical smoking results with subjective smoking performance.

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